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Ono

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(54) **RAM INTAKE UNIT HAVING A SOUND ABSORBING STRUCTURE**

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F02M 35/10	(2006.01)
F02K 1/08	(2006.01)
F02B 77/04	(2006.01)
F01N 13/08	(2010.01)
B62D 61/02	(2006.01)

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(58) **Field of Classification Search** 181/229, 181/227, 219

See application file for complete search history.

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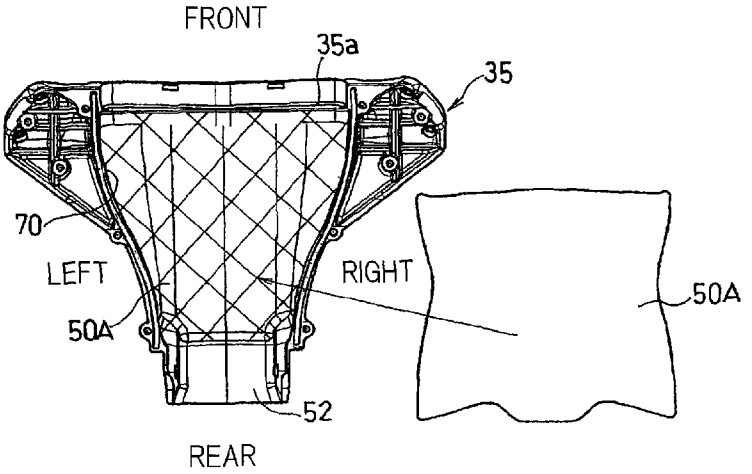
(57) **ABSTRACT**

A ram intake unit mounted on a front portion of a frame structure of a motorcycle includes an acoustic material disposed along an inner wall of a ram air intake duct for absorbing induction noises, which duct forms an induction system through which an incoming wind can be introduced towards a motorcycle combustion engine, and a holder disposed inwardly of the acoustic material for securing the acoustic material to the ram air intake duct.

16 Claims, 10 Drawing Sheets



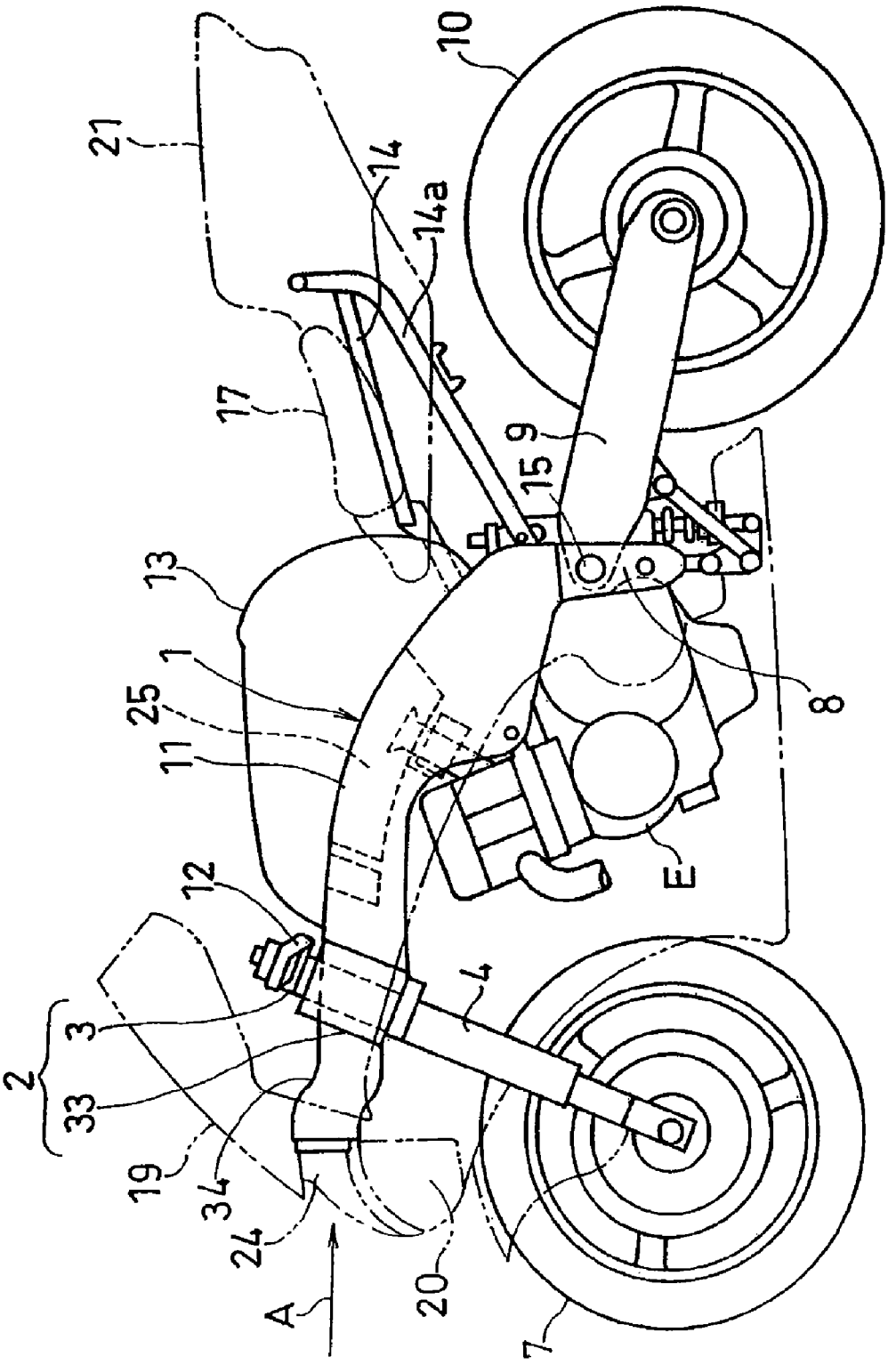


Fig. 1

Fig. 2

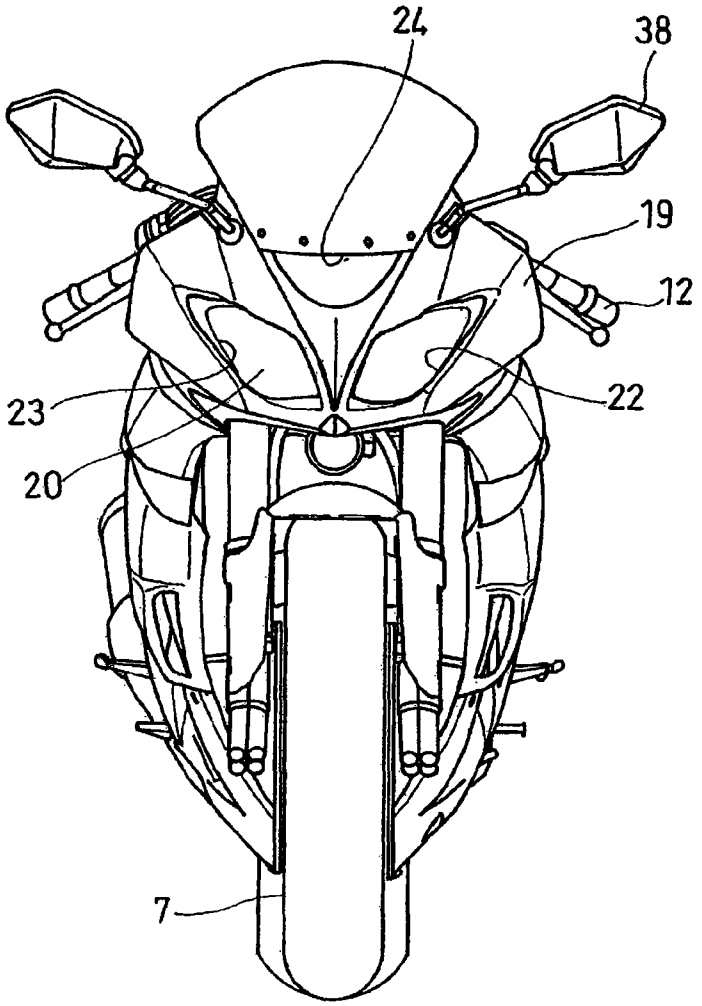
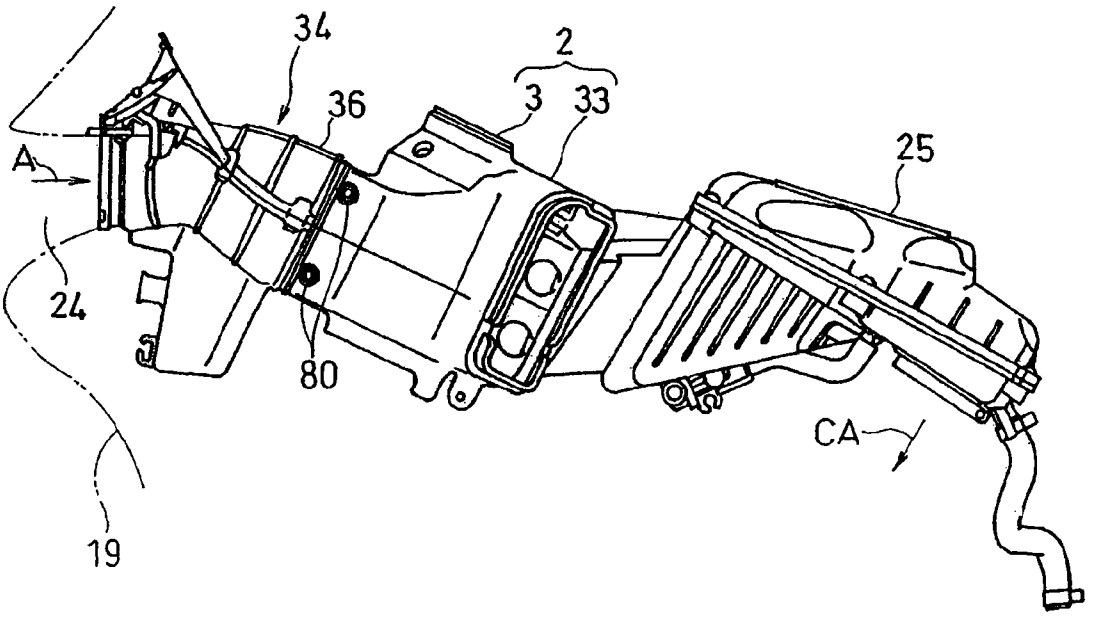
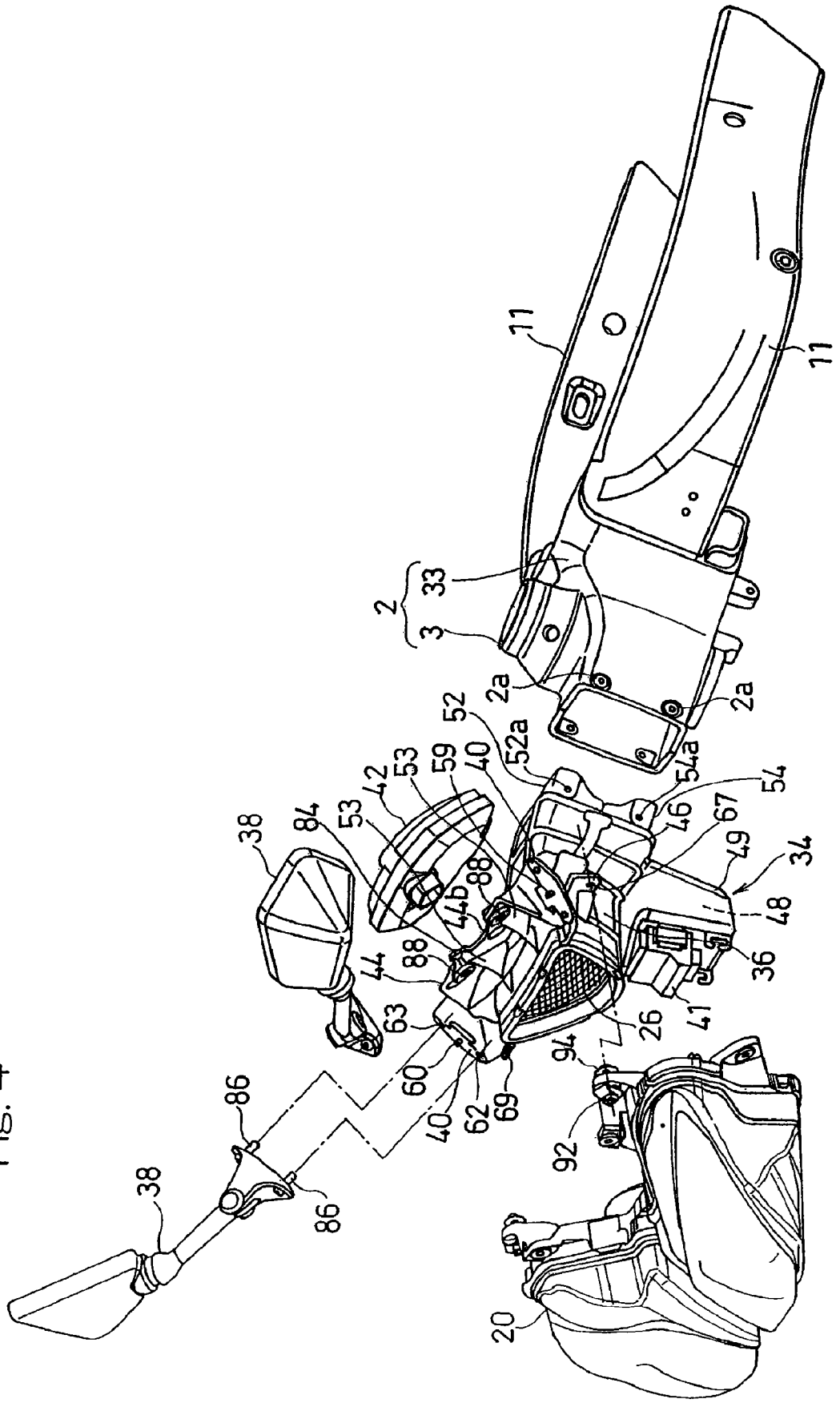


Fig. 3

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2
33
3
2a
2a
52
52a
40
59
53
42
53
84
38
54a
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46
67
49
34
48
36
41
88
44b
88
44
63
60
40
62
69
26
7
94
92
86
86
38
20

Fig. 4

Fig. 5

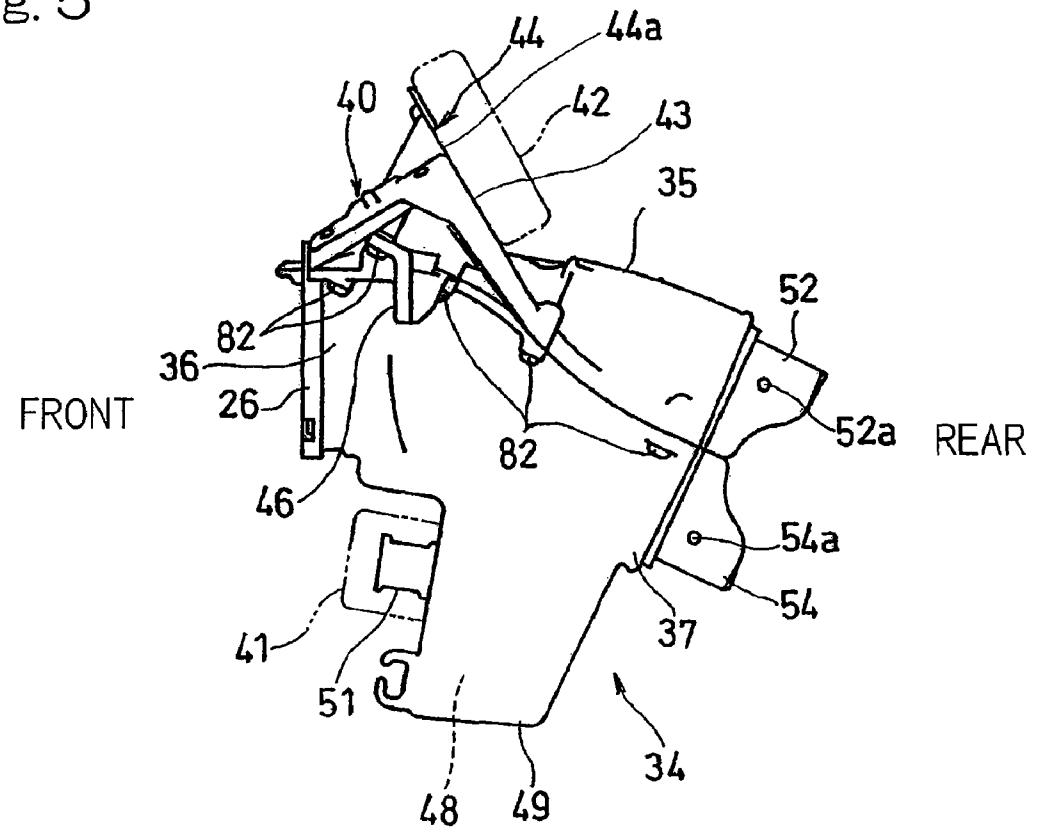
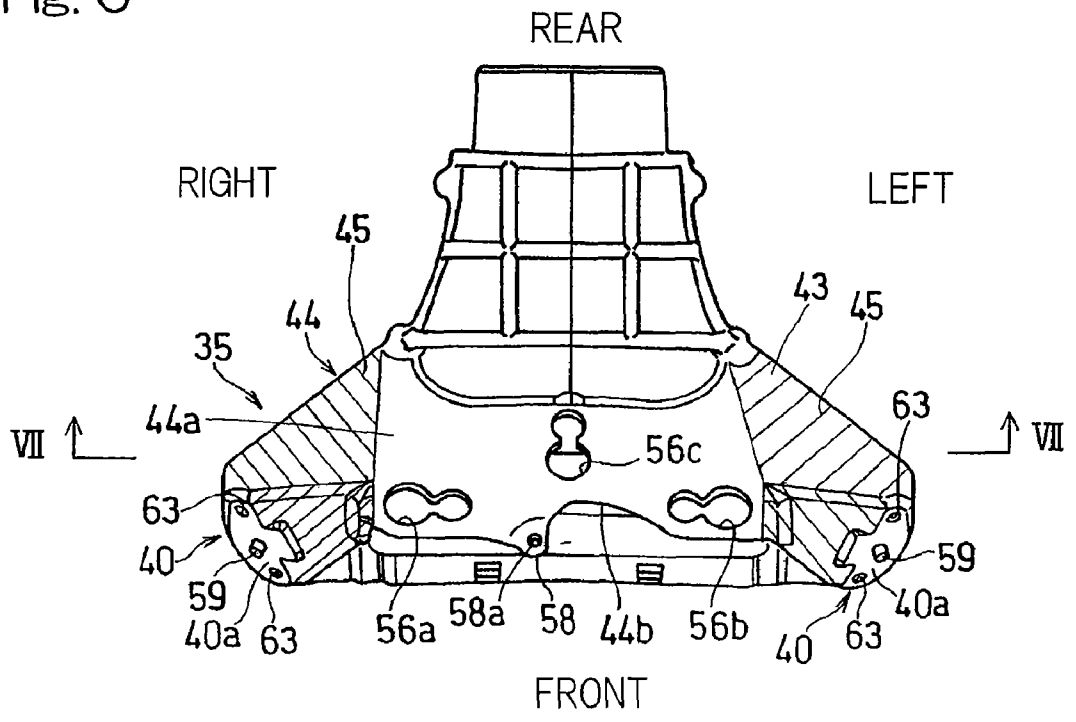

44
44a
40
42
43
35
52
82
36
26
FRONT
82
52a
REAR
46
54a
54
41
37
51
34
48
49

Fig. 6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45
44
43
45
35
44a
63
VII
VII
56c
63
40
59
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40a
63
56a
58a
58
44b
56b
40
63
40a
FRONT

Fig. 7

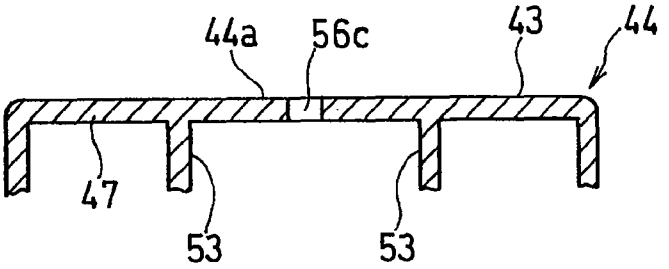


Fig. 8A

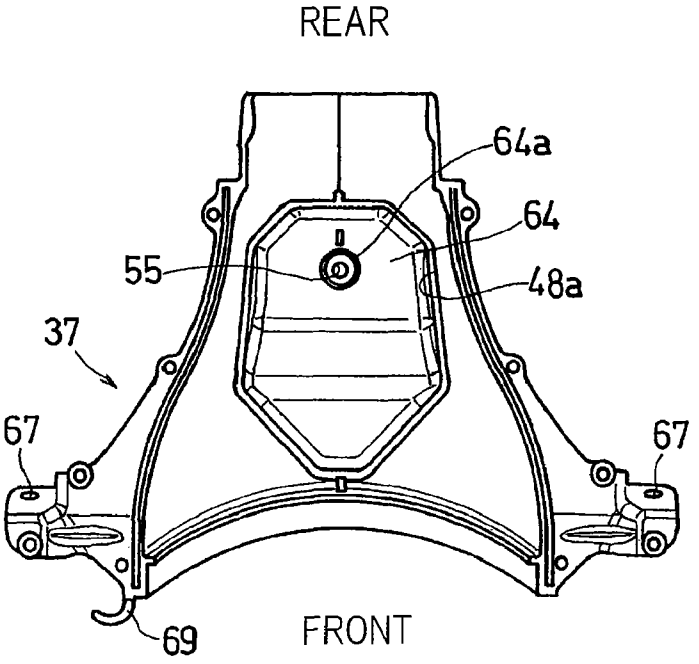


Fig. 8B

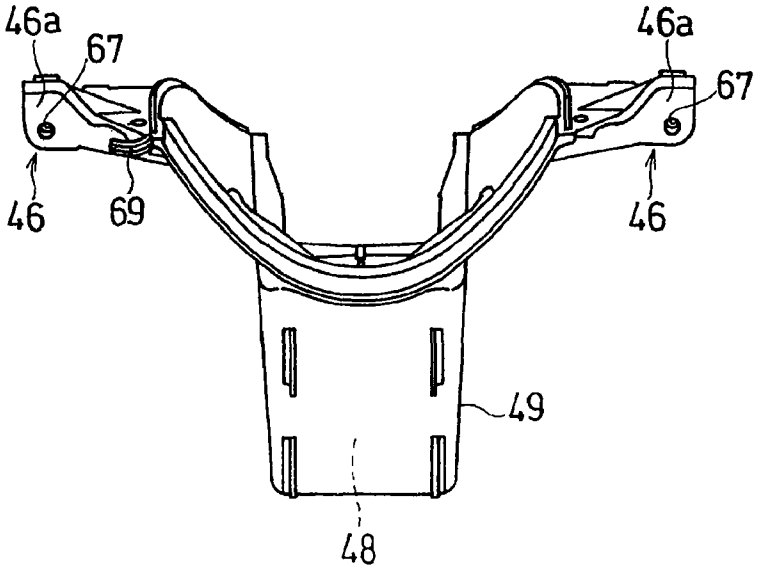
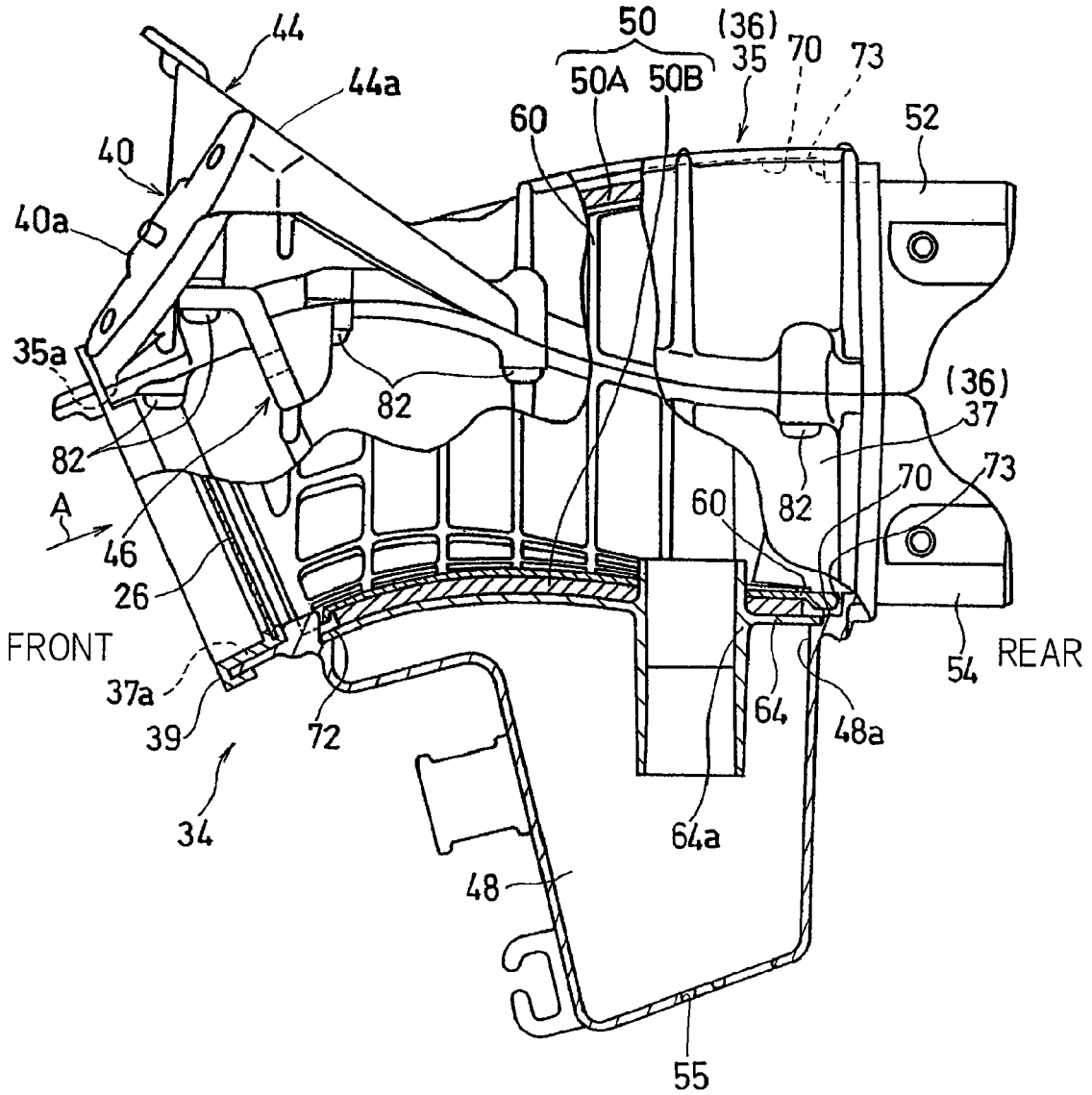


Fig. 9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82
A
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(36)
35
70
73
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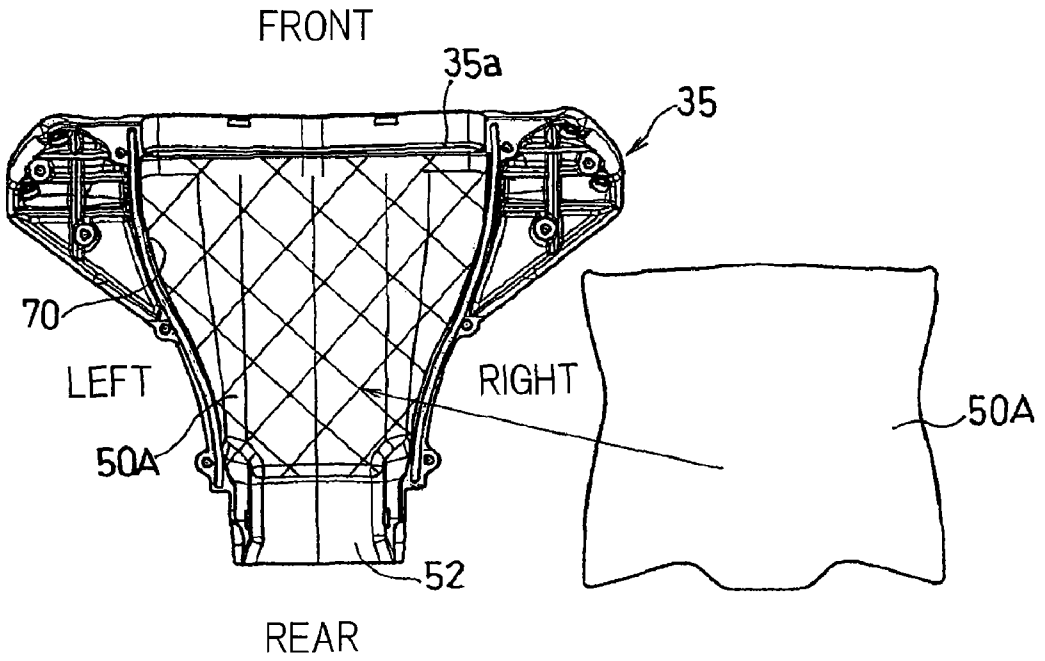
52
(36)
37
70
73
60
82
54
REAR
64
48a
64a
48
55

Fig. 10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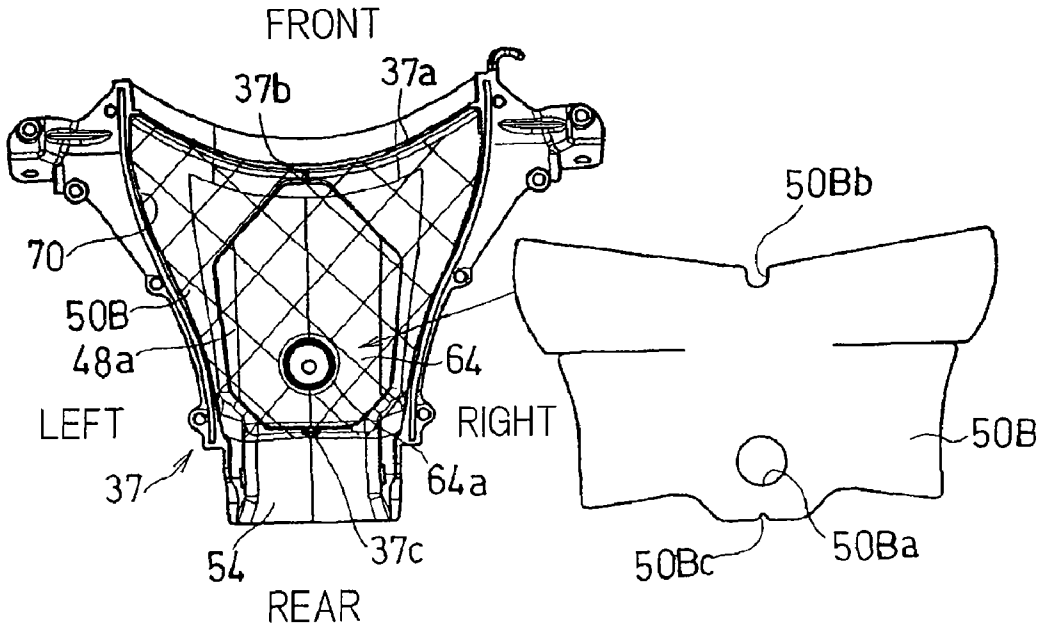
REAR

Fig. 11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50B
37
64a
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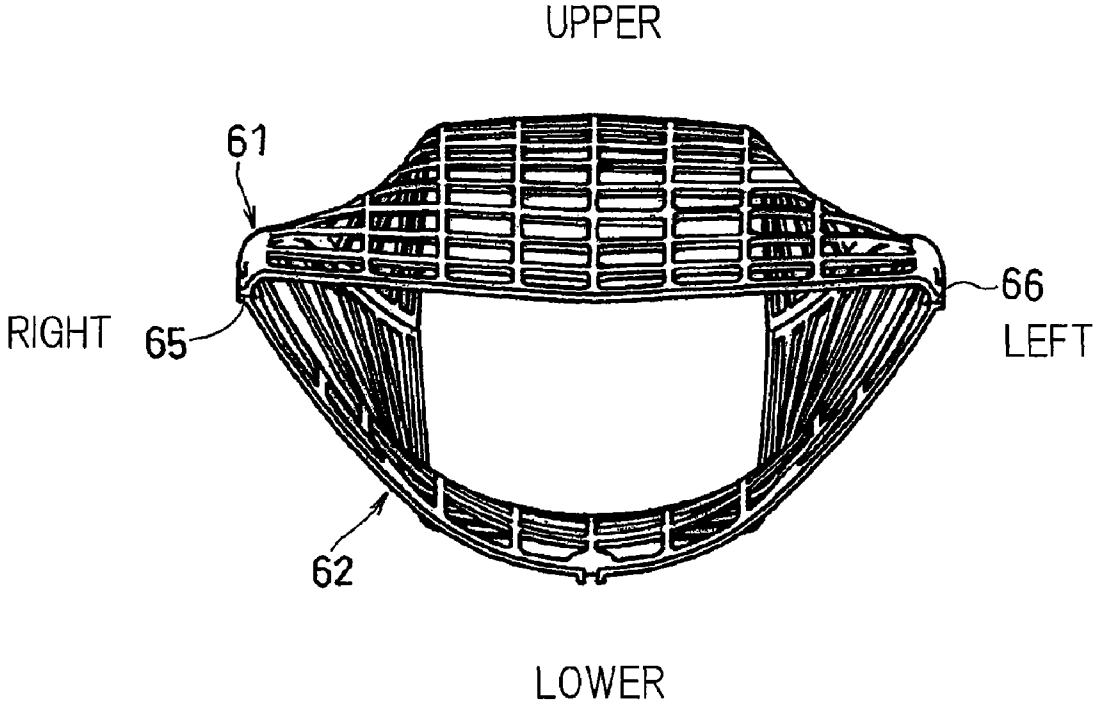
37c
50Bc
50Ba
REAR

Fig. 12


UPPER
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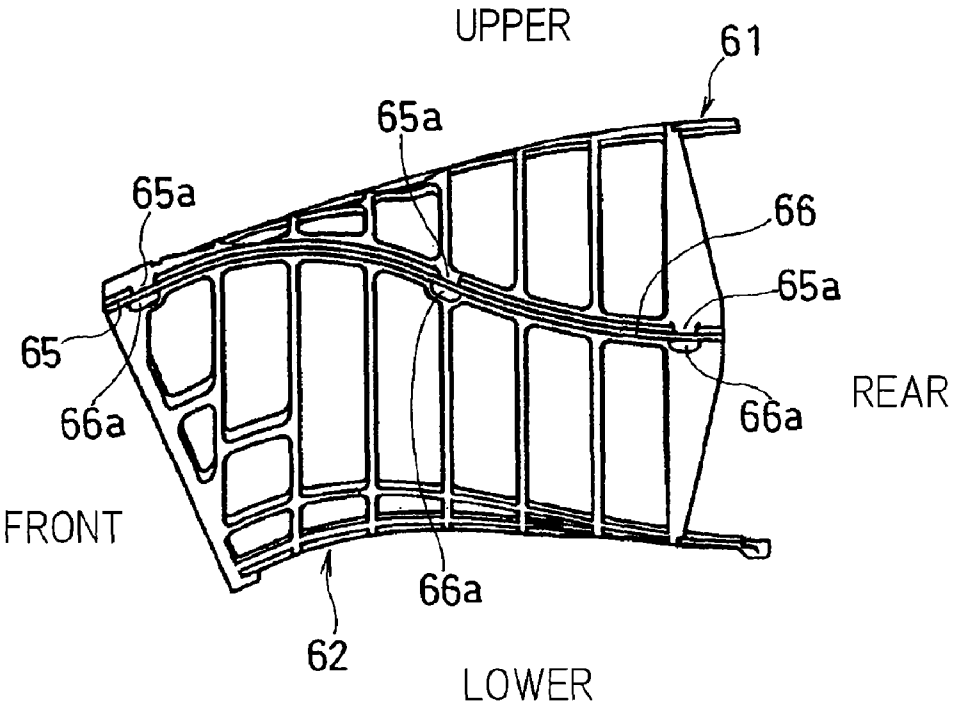
65
66
LEFT
62
LOWER

Fig. 13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REAR
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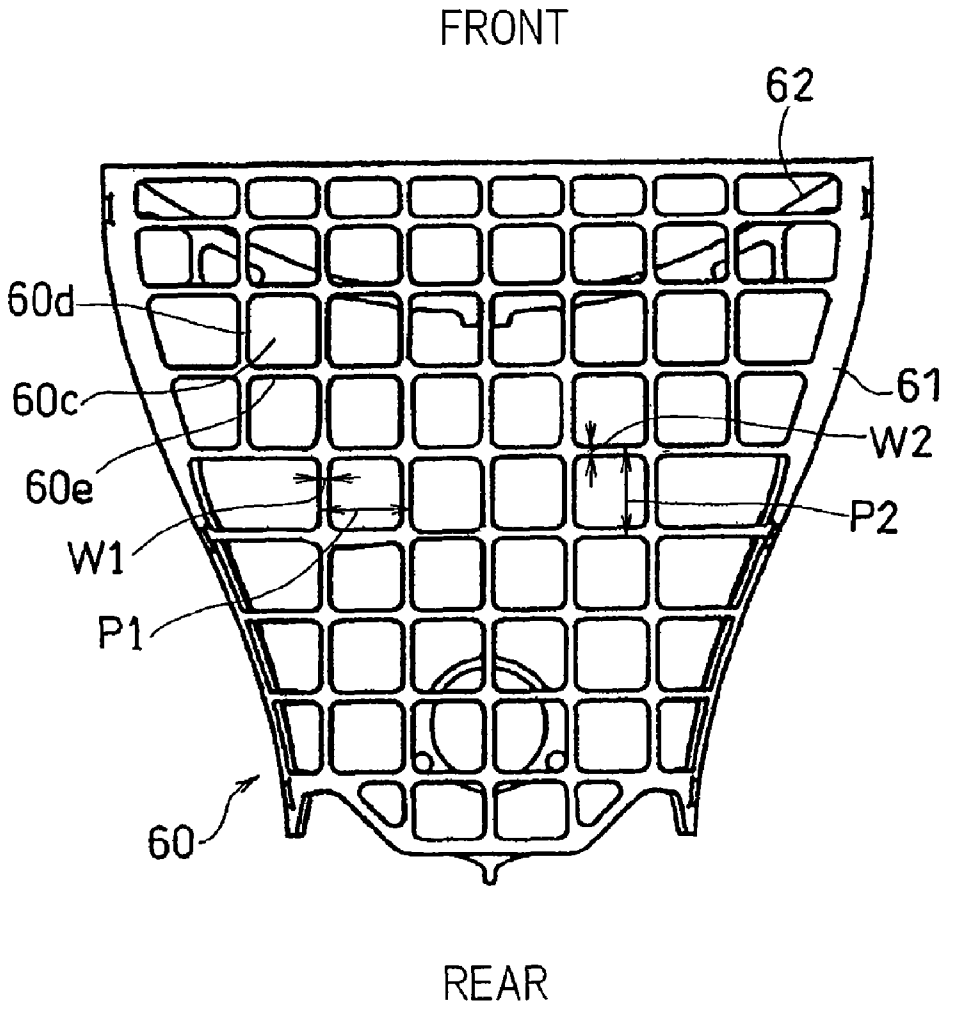
FRONT
66a
62
LOWER

Fig. 14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62
60d
60c
60e
W1
P1
60
61
W2
P2
REAR

Fig. 15

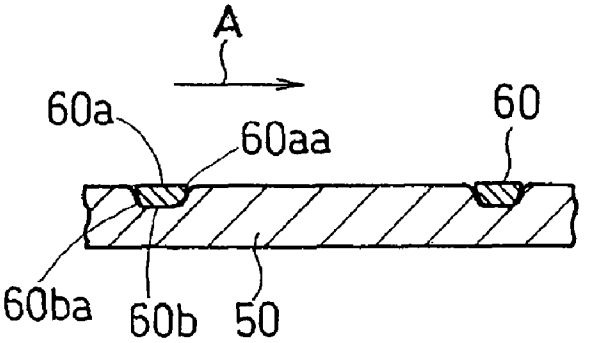
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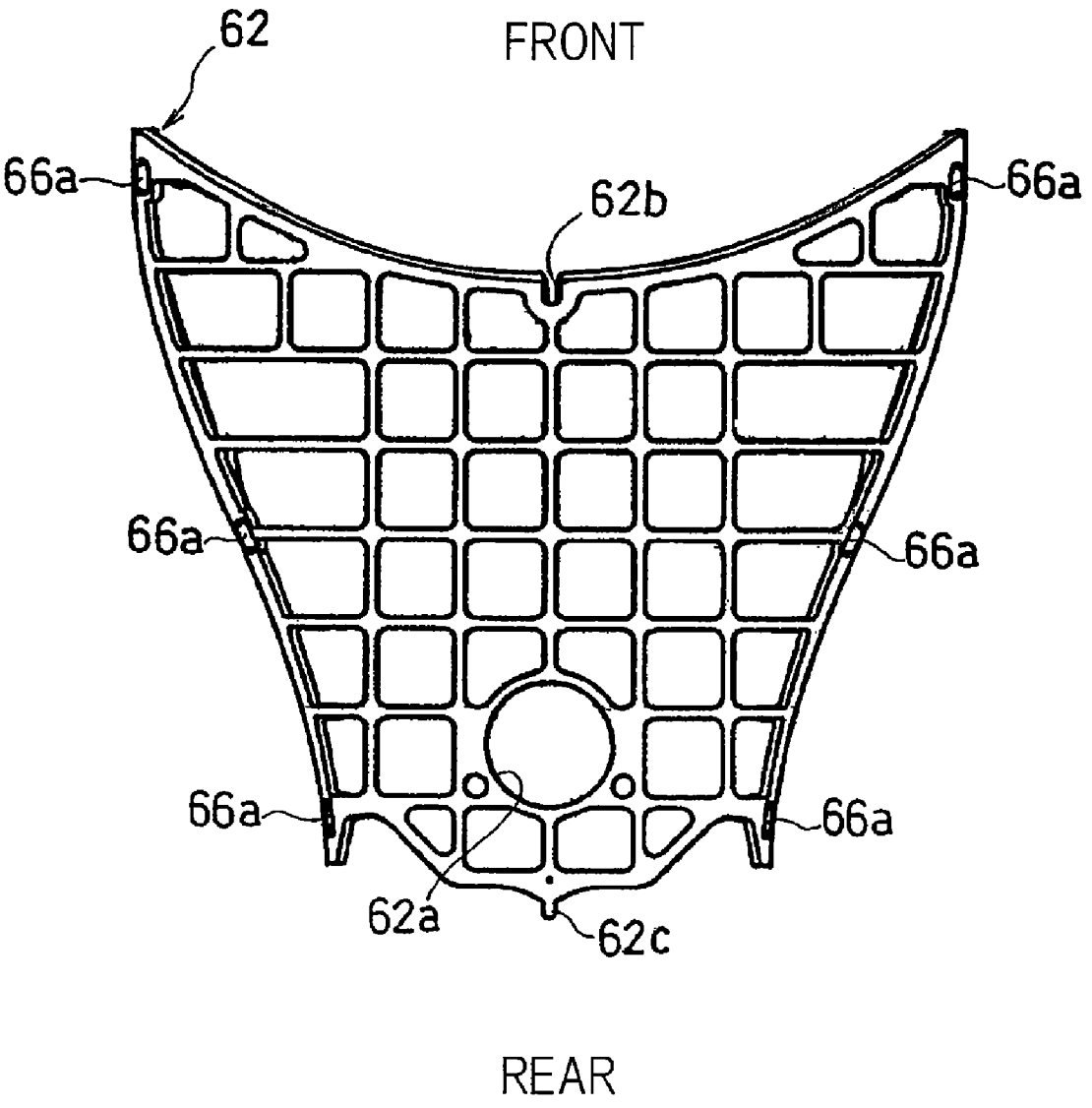
Fig. 16



RAM INTAKE UNIT HAVING A SOUND ABSORBING STRUCTURE

CROSS REFERENCE TO THE RELATED APPLICATION

This application is based on and claims Convention priority to Japanese patent applications No. 2008-241240 and No. 2008-241241, both filed Sep. 19, 2008, the entire disclosure of each of which is herein incorporated by reference as a part of this application.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a ram intake unit employed in a front portion of a motorcycle.

2. Description of the Related Art

In a motorcycle of a kind equipped with a so-called ram induction system, in which an air intake opening for introducing towards a combustion engine an air eventually forming an air-fuel mixture with a fuel, is mounted in a front region of a motorcycle frame structure, an external air is supplied through the air intake opening at the front portion of the motorcycle frame structure to the combustion engine by way of a ram air intake duct and an air cleaner during the travel of the motorcycle. In some of the motorcycles now in use, an acoustic material or a sound absorbing material is applied to inside of the ram air intake duct by means of an adhesive agent such as, for example, one or more lengths of double-sided adhesive tape in order to suppress induction noises then generated in the air intake system.

It has, however, been found that the use of the only adhesive agent to secure the acoustic material often results in removal of the acoustic material from the ram air intake duct by the effect of the incoming wind, which blows during the travel of the motorcycle relatively in a direction opposite to the direction of travel of the motorcycle.

SUMMARY OF THE INVENTION

In view of the foregoing, the present invention has been devised to substantially eliminate the above discussed problems and inconveniences and has for its primary object to provide a ram intake unit in which the acoustic material will not drop out from the ram air intake duct even when exposed to the strong incoming wind.

In order to accomplish the foregoing objects of the present invention, the present invention provides a ram air intake unit for a motorcycle that is mounted on a front region of a motorcycle frame structure, which unit includes an acoustic material disposed along an inner wall of a ram air intake duct, which forms an air intake passage leading to a motorcycle combustion engine, for absorbing induction noises and a holder for securing the acoustic material to the ram air intake duct.

According to the present invention, the acoustic material is retained by the ram air intake duct by means of the holder and, accordingly, even when it is exposed to the strong incoming wind during the travel of the motorcycle, the acoustic material will not drop out and as a result, the sound absorbing effect afforded by the acoustic material can be enjoyed for a prolonged period of time. Also, if the conventional adhesive agent is concurrently employed, the possible removal of the acoustic material from the ram air intake duct can be more effectively avoided.

The holder referred to above is preferably of a netted configuration. The net allows the incoming wind to contact portions of the acoustic material, which are exposed through meshes of such net to the incoming wind, and therefore, a relatively high sound absorbing effect can be maintained.

In a preferred embodiment of the present invention, the ram intake unit may include a stay for supporting a side viewing mirror and a bracket for supporting a gauge unit, and the ram air intake duct, the stay and the bracket are preferably integrally molded of a synthetic resin. This is particularly advantageous in that since the ram air intake duct for introducing an air therethrough, the stay for supporting the side viewing mirror and the bracket for supporting the gauge are formed integrally, the number of component parts used can be reduced to thereby reduce the number of assembling steps. Also, since the use is made of the synthetic resin to reduce the weight and the entirety is molded integrally, the rigidity of the entirety can be increased to secure a required strength, and the increase of the rigidity can contribute to prevention of sound transmission in a flat surface area to thereby increase a sound absorbing effect.

BRIEF DESCRIPTION OF THE DRAWINGS

In any event, the present invention will become more clearly understood from the following description of preferred embodiments thereof, when taken in conjunction with the accompanying drawings. However, the embodiments and the drawings are given only for the purpose of illustration and explanation, and are not to be taken as limiting the scope of the present invention in any way whatsoever, which scope is to be determined by the appended claims. In the accompanying drawings, like reference numerals are used to denote like parts throughout the several views, and:

FIG. **1** is a schematic side view of a motorcycle equipped with a ram intake unit according to a preferred embodiment of the present invention;

FIG. **2** is a schematic front elevational view of the motorcycle shown in FIG. **1**;

FIG. **3** is a side view showing the ram intake unit and its peripheral component parts;

FIG. **4** is an exploded view of the ram intake unit and its peripheral component parts;

FIG. **5** is a side view of the ram intake unit;

FIG. **6** is a top plan view, with a portion shown in section, showing an upper unit half of the ram intake unit;

FIG. **7** is a cross-sectional view taken along the line VII-VII in FIG. **6**;

FIG. **8**A is a top plan view of a lower unit half of the ram intake unit;

FIG. **8**B is a front elevational view showing the lower unit half shown in FIG. **8**A;

FIG. **9** is a longitudinal sectional view of the ram intake unit;

FIG. **10** is a bottom plan view showing the upper unit half of the ram intake unit;

FIG. **11** is a top plan view showing the lower unit half of the ram intake unit;

FIG. **12** is a front elevational view of a holder employed for the ram intake unit;

FIG. **13** is a side view of the holder shown in FIG. **12**;

FIG. **14** is a top plan view of the holder;

FIG. **15** is a fragmentary sectional view showing an acoustic material fixed by the use of the holder; and

FIG. **16** is a bottom plan view showing the lower holder half of the holder.

The following reference numerals denote the following legends.

E: Combustion engine
1: Motorcycle frame structure
20: Headlamp assembly
34: Ram intake unit
36: Ram air intake duct
37*b*: Front engaging member
37*c*: Rear engaging member
38: Side viewing mirror
40: Stay
40*a*: Mirror mounting surface
42: Gauge unit
44: Bracket
44*a*: Gauge mounting surface
46: Headlamp support piece
48: Resonator chamber
50: Acoustic material
53: Rib
60: Holder
62*b*: Front engagement area
62*c*: Rear engagement area
69: Hook
70: Recess

DESCRIPTION OF THE PREFERRED EMBODIMENTS

A preferred embodiment of the present invention will be described in detail with reference to the accompanying drawings. Of those accompanying drawings, FIG. **1** schematically illustrates a side view of a motorcycle equipped with a ram intake unit according to the preferred embodiment of the present invention.

Referring to FIG. **1**, the motorcycle shown therein includes a motorcycle frame structure **1** having a main frame **11** and a head block **2** at a front portion of the main frame **11**. This head block **2** includes a head tube **3** formed integrally therewith, and a front fork assembly **4** is rotatably supported by the head tube **3** through a steering shaft (not shown), with a front wheel **7** rotatably supported at a lower end thereof for rotation in any manner known to those skilled in the art.

A swingarm bracket **8** is secured to a lower intermediate portion of the motorcycle frame structure **1**, and a swingarm **9** is pivotably supported by the swingarm bracket **8** through a pivot pin **15** at a front end thereof for movement up and down. The swingarm **9** in turn supports a rear wheel **10** rotatably in any manner known to those skilled in the art. A combustion engine E forming a motorcycle power plant is mounted in a generally lower intermediate portion of the motorcycle frame structure **1** and is drivingly coupled with a rear wheel **10** for driving the latter through a drive transmission chain (not shown). A handlebar **12** is rigidly mounted on respective upper end portions of the steering shaft and the front fork assembly **4** for steering movement so that the motorcycle can be maneuvered. A fuel tank **13** is mounted on the main frame **11**.

Left and right seat rails **14** and corresponding reinforcement rails **14***a* are provided in a rear portion of the main frame **11** of the motorcycle frame structure **1**, and a seat assembly made up of a rider's seat **17** and a fellow passenger's seat **21** is mounted on the seat rails **14**. A fairing **19** made of a synthetic resin is fixedly mounted on the front portion of the motorcycle frame structure **1** so as to cover a space ranging from a region forwardly of the handlebar **12** to lateral regions on left and right sides of that front portion of a motorcycle body.

Referring now to FIG. **2**, which illustrates a schematic front elevational view of the motorcycle shown in FIG. **1**, the fairing **19** has various openings defined therein. Those openings in the fairing **19** include left and right headlamp apertures **22** and **23** for accommodating left and right headlamp units forming respective parts of a headlamp assembly **20** and an air intake opening **24** defined in the fairing at a location intermediate between and above the headlamp apertures **22** and **23** for introducing towards the combustion engine E, an air which eventually forms an air-fuel mixture in admixture with a fuel. Left and right side viewing mirrors **38** are mounted on respective portions of the fairing **19** on left and right sides of the air intake opening **24**, respectively.

As shown in FIG. **3**, the head block **2** referred to above is in the form of a casting formed integrally with the head tube **3** and an intake duct **33** open at a front end thereof. A ram intake unit **34** in accordance with the present invention, which is made of a synthetic resin, is coupled with a front end portion of the intake duct **33**. This ram intake unit **34** is secured at a rear portion thereof to the head block **2** by means of a plurality of fastening members **80** such as, for example, bolts with the front end opening thereof positioned in alignment with the air intake opening **24** that is defined in the fairing **19** as hereinbefore described. The head block **2** has a rear end portion to which an air cleaner **25** is fluid coupled. Hence, the incoming air A or a wind, then blowing during the travel of the motorcycle relatively in a direction opposite to the direction of travel of the motor, can introduced from the air intake opening **24** through the ram intake unit **34** and then through the intake duct **33** into the air cleaner **25** where the air A so introduced is substantially purified to provide a purified air CA, which is subsequently supplied to the combustion engine E shown in FIG. **1**.

FIG. **4** illustrates an exploded view of the ram intake unit **34** and its peripheral components. As shown therein, the ram intake unit **34** is of one piece construction made of a synthetic resin, including a ram air intake duct **36** for sucking air to be introduced into the combustion engine E, a stay **40** employed for each of the side viewing mirrors **38** for supporting the corresponding side viewing mirrors **38**, a bracket **44** for supporting a gauge unit or a meter unit **42** comprised of an instrument casing accommodating therein, for example, a speedometer and an engine tachometer, headlamp support pieces **46** to which the headlamp assembly **20** is fitted, and a resonator box **49** defining a resonator chamber **48** in which induction noises can be suppressed. The headlamp assembly **20** referred to above is of a type having, for example, left and right headlamp units and a position lamp all built therein.

The ram intake unit **34** is schematically shown in a side view in FIG. **5**. Referring to FIG. **5**, the ram intake unit **34** is of a split molded product made up of upper and lower unit halves **35** and **37**. The upper unit half **35** of the ram intake unit **34** is formed with the stay **40** and the bracket **44**, both referred to previously whereas the lower unit half **37** of the ram intake unit **34** is formed with the lamp support pieces **46** and the resonator box **49** both similarly referred to previously. The resonator box **49** protrudes downwardly of the lower unit half **37** and has an outer front end face formed integrally with a projection **51** on which an amplifier **41** for an immobilizer is detachably mounted.

In the illustrated embodiment, the upper and lower unit halves **35** and **37** of the ram intake unit **34** are connected together by means of a plurality of, for example, ten, fastening members such as tapping screws **82**. The ram air intake duct **36** has its front end to which a screen **26** in the form of a metal net is fitted for avoiding ingress of foreign matter. Also, the upper and lower unit halves **35** and **37** have respective rear

ends formed integrally with corresponding tabs **52** and **54**, and bolt insertion holes **52***a* and **54***a* for the passage therethrough of the fastening members **80** described hereinbefore and shown in FIG. **3** are defined in those associated tables **52** and **54**. The ram intake unit **34** is secured to the head block **2** by means of the fastening members **80** that are fastened firmly after having passed through the respective bolt insertion holes **52***a* and **54***a*.

The gauge supporting bracket **44** has a gauge mounting surface **44***a* oriented substantially diagonally upwardly towards the eyes of a motorcycle rider then sitting on the rider's seat and the mirror support stay **40** for each of the left and right side viewing mirrors **38** has a respective mirror mounting surface **40***a* oriented substantially diagonally forwards of the motorcycle frame structure **1**. As shown in FIG. **6** showing a top plan view of the upper unit half **35** of the ram intake unit **34**, the bracket **44** and a rear portion of each of the mirror support stays **40** are connected by a substantially flat continuous wall. In other words, that rear portion of each of the mirror support stays **40** is rearwardly upwardly bulged so that, as best shown in FIG. **7**, the gauge mounting surface **44***a* oriented substantially diagonally rearwardly and a stay rear surface **43** continued from each of the mirror mounting surfaces **40***a* oriented substantially diagonally forwards are connected together through a continuous wall **47** to define a continuous surface extending smoothly and continuously therebetween.

Accordingly, the ram intake unit **34** can have an increased volume enough to have a high rigidity and, therefore, the gauge unit **42** shown in FIG. **4** and the left and right side viewing mirrors **38** can be firmly mounted on the gauge mounting surface **44***a* and the mirror mounting surfaces **40***a*, respectively.

In other words, the gauge unit **42** is disposed at an intermediate portion of the motorcycle frame structure **1** with respect to the widthwise direction of the motorcycle and rearwardly thereof (adjacent the motorcycle rider then occupying the rider's seat **17**) for better visibility by the motorcycle rider, while the left and right side viewing mirrors **38** are disposed on left and right sides of the motorcycle frame structure **1** and forwardly of the gauge unit **42** with respect to the direction of forward travel of the motorcycle. Accordingly, since the mirror mounting surfaces **40***a* are also positioned laterally of the gauge mounting surface **44***a* with respect to the widthwise direction of the motorcycle and forwardly of the gauge mounting surface **44***a* with respect to the direction of forward travel of the motorcycle, respective rear areas of the mirror mounting surfaces **40***a*, that is, opposite lateral areas of the gauge mounting surface **44***a* are generally apt to be structurally depressed downwardly.

However, according to the illustrated embodiment of the present invention, the gauge mounting surface **44***a* positioned at a location intermediate of the width of the motorcycle frame structure **1** as shown in FIG. **7** and the mirror mounting surfaces **40***a* on respective left and right sides thereof, inclusive of the stay rear surfaces **43** at respective rear portions of the mirror mounting surfaces **40***a*, are continued to each other to form a continuous wall without any recess or depression. Accordingly, pads **45** each shown by the hatched area in FIG. **6**, are formed to allow the ram intake unit **34** to have an increased volume, which in turn results in increase of the rigidity. As discussed above, the presence of those pads **45** renders the gauge mounting surface **44***a* to represent a generally sector shape when viewed from top. Also, providing a rear surface of the bracket **44**, which is oriented forwardly downwardly of the head block **2** as shown in FIG. **4**, with reinforcement ribs **53** allows the gauge unit **42** and the side viewing mirrors **38** to be supported further firmly.

The gauge mounting surface **44***a* defined in the bracket **44** is formed with a plurality of gauge mounting holes **56**A to **56**C. In the embodiment now under discussion, the three gauge mounting holes **56**A to **56**C are shown as employed, but the number of those gauge mounting holes that can be employed in the practice of the present invention may not be always limited thereto.

The gauge mounting surface **44***a* has a recess **44***b* defined in a front end intermediate portion thereof for the passage therethrough of gauge connecting harnesses and also has a projection **58** formed integrally with the ram intake unit **34** therein in the vicinity of the recess **44***b*. This projection **58** has an insertion hole **58***a* defined therein for the passage therethrough of an elastic member **84** (best shown in FIG. **4**) such as, for example, a damper for vibration isolation of the gauge unit **42**. The mirror mounting surfaces **40***a* of the left and right mirror support stays **40** are formed with respective positioning projections **59** and respective screw holes **63** engageable with corresponding fastening members **86** such as, for example, bolts (best shown in FIG. **4**). Also, the recess **44***b* referred to above can be used not only to accommodate the gauge connecting harnesses, but also to accommodate couplers that are provided in harness terminals or the gauge unit **42**.

The lower unit half **37** is best shown in FIG. **8**A in a top plan representation and in FIG. **8**B in a front elevational representation. The resonator chamber **48** formed integrally with a lower portion of the lower unit half **37** has an opening **48** defined therein, which opening **48** is closed by a separate covering **64** having a connecting tube **64***a* secured thereto. The resonator chamber **48** has a bottom wall formed with a drain hole **55** defined therein. Each of the left and right headlamp support pieces **46** for supporting the headlamp assembly **20** best shown in FIG. **4** has a respective mounting surface **46***a* oriented generally forwards with respect to the direction of forward travel of the motorcycle and has a bolt insertion hole **67** defined therein for supporting the headlamp assembly **20** by means of a screw member engaged therein. It is to be noted that the headlamp assembly **20** and the fairing **19** best shown in FIG. **1** may be concurrently coupled together by the utilization of those bolt insertion holes **67**.

The lower unit half **37** has a hook member **69** formed integrally therewith for engagement with a harness (not shown) coupled with the gauge unit **42** (shown in FIG. **4**) and positioned on a right side of a front end of the lower unit half **37**. It is, however, to be noted that the position where the hook member **69** is formed is not always limited to that shown and described.

Referring to FIG. **9** showing a fragmentary longitudinal sectional representation of the ram intake unit **34**, the ram intake unit **34** includes an acoustic material or a sound absorbing material **50** for absorbing suction noises and a netted holder **60** for fitting the acoustic material **50** to the ram air intake duct **36**. This acoustic material **50** is made of any known flexible material such as, for example, urethane sponge and is arranged inside the ram air intake duct **36**, having been bent to follow an inner wall of the ram air intake duct **36**. The netted holder **60** is arranged inside the ram air intake duct **36** and positioned inwardly of the acoustic material **50** with respect to the inner wall thereof.

As shown in FIG. **10** showing a bottom plan view of the upper unit half **35**, a screen upper support **35***a* for supporting the screen **26** is formed in a front portion of an inner peripheral surface of the upper unit half **35**, and an acoustic material **50**A that is fitted to the upper unit half **35** is, as shown by the

cross hatching in FIG. **10**, so arranged as to cover the entire inner peripheral surface of the upper unit half **35** ranging from a rear end of the screen upper support **35***a* to the tab **52**.

FIG. **11** illustrates the lower unit half **37** in a top plan representation. A screen lower support **37***a* for supporting the screen **26** is formed in a front portion of an inner peripheral surface of the lower unit half **37**, and a front engaging member **37***b* in the form of a projection and used to regulate the position of the holder **60** in a direction circumferentially thereof is formed rearwardly of the screen lower support **37***a* in an intermediate portion of the lower unit half **37** with respect to the width of the motorcycle. A rear engaging member **37***c* in the form of a groove and used to regulate the position of the holder **60** in the circumferential direction is also formed in that intermediate portion of the lower unit half **37** with respect to the width of the motorcycle and immediately forwardly of the tab **54**.

An acoustic material **50**B that is fitted to the lower unit half **37** is, as shown by the cross hatching in FIG. **11**, so arranged as to cover the entire inner peripheral surface of the lower unit half **37** ranging from a rear end of a screen lower support **37***a* in the lower unit half **37** to the tab **54**. This acoustic material **50**B has formed therein a throughhole **50**Ba, through which the connecting tube **64***a* extends, and cutouts **50**Bb and **50**Bc through which the holder front support **37***b* and the holder rear support **37***c* extend respectively.

As shown in FIG. **9**, a recess **70** for accommodating the acoustic material **50**B and the holder **60** is defined in an inner surface of the lower unit half **37**, and respective positions of the acoustic material **50**B and the holder **60** with respect to a direction longitudinally of the motorcycle are regulated by front and rear steps **72** and **73** both formed in longitudinal end portions of the recess **70**. This equally applies to the upper unit half **35**.

The holder **60** referred to previously is shown in FIG. **12** in a front elevational view, in FIG. **13** in a side view and in FIG. **14** in a top plan view. This holder **60** is, as best shown in FIGS. **12** and **13**, in the form of a split type resin molded product made up of upper and lower holder halves **61** and **62**. Each of the upper and lower holder halves **61** and **62** is formed by the use of a mold having a split face thereof at an inner surface **60***a* of respective holder half **61** or **62** and has therefore opposite end edges **60***aa* of the inner surface **60***a* representing a sharp corner while an outer surface **60***b* has opposite end edges **60***ba* each representing a rounded corner. By so molding the respective holder half **61** or **62**, the acoustic material **50** bites or cuts into meshes of the netted holder **60** to allow the inner surface **60***a* of the holder **60** to be flush with an inner surface of the acoustic material **50** so as to be smoothed out as best shown in FIG. **15** and as a result, the air resistance can be reduced. As best shown in FIG. **14**, the holder **60** is formed with a multiplicity of the meshes **60***c* each extending completely across the holder **60** so as to open at opposite inner and outer surfaces thereof and, in the instance now under discussion, those meshes **60***c* are delimited by a plurality of elongated longitudinal ribs **60***d* and a plurality of elongated transverse ribs **60***e* that are crossed relative to each other.

Each of the elongated longitudinal ribs **60***d* extending in a longitudinal direction has a width W**1** chosen to be within the range of 0.5 to 2.0 mm and preferably within the range of 0.7 to 1.7 mm. The distance P**1** between respective intermediate portions of the neighboring longitudinal ribs **60***d* is so chosen as to be within the range of 5 to 15 mm and preferably within the range of 7 to 13 mm, excluding some of those elongated longitudinal ribs that are positioned proximate to longitudinal ends or opposite sides of each of the upper and lower holder halves **61** and **62**. On the other hand, each of the elongated transverse ribs **60***e* has a width W**2** chosen to be within the range of 0.5 to 2.0 mm and preferably within the range of 0.7 and 1.7 mm. The distance P**2** between respective intermediate portions of the neighboring transverse ribs **60***e* is so chosen as to be within the range of 5 to 15 mm and preferably within the range of 7 to 13 mm, excluding some of those elongated transverse ribs that are positioned proximate to the longitudinal ends of each of the upper and lower holder halves **61** and **62**.

If the longitudinal and transverse sizes of those meshes **60***c* are so chosen as to fall within the above discussed range, the holder **60** can restrain the acoustic material **50** with sufficient pressing force and strength, and also the meshes **60***c* can have a size sufficient to allow portions of the acoustic material **50** to be exposed therethrough to enable the acoustic material **50** to exhibit a high effect of suppressing the induction noises.

In describing the foregoing embodiment of the present invention, though the holder **60** has been shown and described as made of a synthetic resin, the holder **60** may be made of a metallic material such as, for example, aluminum. In such case, the holder **60** and the screen **26** can be formed integrally with each other. In addition, although the use of the holder **60** of the netted configuration as discussed above is preferred, the holder **60** may have neither mesh nor hole defined therein particularly where the acoustic material **50** is prepared from rubber or the like. Even in this case, hissing sounds transmitting across a peripheral wall of the ram air intake duct **36** can be suppressed, and also the air resistance can be reduced as a result of flatness of the inner surface of the ram air intake duct **36**. Yet, in the practice of the present invention, the holder **60** may be of a split type comprised of left and right halves.

As best shown in FIG. **12**, the upper holder half **61** and the lower holder half **62** have outer shapes following the inner shapes of the upper unit half **35** and the lower unit half **37**, respectively, and, hence, curved to bulge outwardly. Because of those shapes, the holder **60** can stably support the acoustic material **50**.

Left and right side rim portions of each of the upper and lower holder halves **61** and **62** is formed with respective mating faces **65** and **66** both extending in a direction generally conforming to the longitudinal sense of the motorcycle. As best shown in FIG. **13**, the mating face **65** of the upper holder half **61** is formed with a plurality of downwardly protruding engagement protuberances **65***a*, which have an elasticity and which are, in the illustrated instance, located at a front area, an intermediate area and a rear area of each of the left and right side rim portions of the upper holder half **61**. However, position and number of the downwardly protruding engagement protuberances **65***a* are not always limited thereto.

On the other hand, portions of the mating faces **66** of the lower holder half **62** are formed with engagement recesses **66***a* at respective locations alignable respectively with the engagement protuberances **65***a* in the mating faces **65** of the upper holder half **61**. It is, however, to be noted that the engagement recesses and the engagement protuberances may be formed in the upper holder half **61** and the lower holder half **62**, respectively. With the engagement protuberances **65***a* engaged in the engagement recesses **66***a*, the upper and lower holder halves **61** and **62** are coupled together to provide the holder **60**.

FIG. **16** illustrates a bottom plan view of the lower holder half **62**. As shown therein, the lower holder half **62** is formed with a throughhole **62***a* defined in a portion thereof adjacent a rear end thereof for the passage therethrough of the connecting tube **64***a* (FIG. **9**), a front engagement area **62***b* defined in an intermediate portion of the front end with respect to the width of the motorcycle in the form of a groove

engageable with the front engaging member **37***b* (FIG. **11**), and a rear engagement area **62***c* defined in such intermediate portion of the rear end in the form of a projection engageable with the rear engaging member **37***c*.

Hereinafter, the manner of assembling the ram intake unit **34** will be described in detail. At the outset, as shown in FIG. **9**, the opening **48***a* of the lower unit half **37** has to be closed with the covering **64**. Then, the acoustic materials **50**A and **50**B have to be fitted to the respective inner surfaces of the upper unit half **35** and the lower unit half **37** by means of the lengths of double-sided adhesive tape. Thereafter, the upper and lower holder halves **61** and **62** are coupled together with the engagement projections **65***a* engaged respectively in the engagement recesses **66***a*. It is, however, to be noted that the upper and lower holder halves **61** and **62** may be integrated together by use of a bonding material.

After the holder **60** has been so formed, in a condition in which the holder **60** is positioned in the circumferential direction with the front engagement area **62***b* engaged in the front engaging member **37***b* and with the rear engagement area **62***c* engaged in the rear engaging member **37***c*, the lower holder half **62** is mounted inside the recess **70** in the lower unit half **37**, allowing the holder **60** to be thus fitted to the lower unit half **37**. In this way, the acoustic material **50**B is firmly fixed to the lower unit half **37** while having been sandwiched between the lower holder half **62** and the lower unit half **37**.

Thereafter, the upper unit half **35** and the lower unit half **37** are, after having been positioned one above the other, fastened together by means of the tapping screws **82**. At this time, the holder **60** is accommodated within the recess **70** defined in the upper unit half **35**. Finally, the screen **26** integrated with a rubber packing **39** shown in FIG. **6** is inserted into the ram air intake duct **36**. In the embodiment hereinabove described, the acoustic material **50** has been shown and described as fixed in position by means of the lengths of double-sided adhesive tape and the holder **60**, but the use of the lengths of double-sided adhesive tape may be dispensed with and the acoustic member **50** may be fixed in position by means of only the holder **60**.

After the ram intake unit **34** has been assembled in the manner described above, the gauge unit **42** best shown in FIG. **4** is mounted on the ram intake unit **34**. Specifically, the gauge unit **42** is fixedly mounted on the bracket **44** by inserting elastic members **88** such as, for example, grommets into the left and right meter mounting holes **56**A and **56**B shown in FIG. **6** and then threadingly inserting fastening members (not shown) into corresponding internally threaded holes (also not shown), which are defined in the gauge unit **42**, past the associated elastic members **68**. With the elastic members **88** and **84** engaged in the remaining gauge mounting hole **56**C and the insertion hole **58***a*, the gauge unit **42** has its rear surface urged against the gauge mounting surface **44***a* to thereby allow the gauge unit **42** to be prevented from swaying. The harnesses to be connected with the gauge unit **42** are connected with the gauge unit **42** through the recess **44***b*.

Referring to FIG. **4**, each of the side viewing mirrors **38** is fixed in position with the positioning projection **59** of the corresponding stay **40** engaged in an associated engagement hole defined in the side viewing mirror **38**, followed by fastening the corresponding fastening member **86** into the screw hole **63**.

The headlamp assembly **20** is fitted to the ram intake unit **34** by inserting the fastening members **94** such as, for example, bolts into mounting hole (not shown) in the headlamp assembly **20** and the bolt insertion holes **67** in the headlamp support pieces **46**, followed by threading respective clamp nuts **92** for the headlamp assembly **20**. Where the headlamp assembly **20** and the fairing **19** are to be concurrently fastened to the ram intake unit **34**, the fastening members **94** such as, for example, bolts have to be inserted into the bolt insertion holes **67** in the ram intake unit **34** and the mounting hole (not shown) in the headlamp assembly **20**, followed by fastening clamp nuts provided in the fairing **19**. In the illustrated embodiment, the headlamp assembly **20** has its upper portion supported by the headlamp support pieces **46** and its lower portion supported by the fairing **19** by means of extra support means.

The ram intake unit **34** of the structure hereinbefore described is fitted to the head block **2** with the fastening members **80** (shown in FIG. **3**) threadingly engaged into the bolt insertion holes **52***a* and **54***a* thereof and the screw holes **2***a* in the head block **2**.

With the present invention having been fully described hereinbefore, it will readily understood that the following numerous effects can be obtained.

Specifically, since the acoustic material **50** is fixed in position having been sandwiched between the holder **60** and the ram air intake duct **36**, the acoustic material **50** does not drop out even when exposed to the strong incoming wind and as a result, can provide a sound absorbing effect for a prolonged period of time. Also, since bonding by means of the lengths of double-sided adhesive tape is also concurrently used, the possibility of the acoustic material **50** being separated from the ram air intake duct **36** can be further effectively avoided. In addition, since the holder **60** is of a netted configuration, the incoming wind effectively contacts those portions of the acoustic material **50** exposed through the meshes and, therefore, a high sound absorbing effect can be maintained.

The acoustic material **50** and the holder **60** are accommodated within the recess **70** defined in the inner surface of the ram air intake duct **36** so that the position thereof along a longitudinal axis of the motorcycle can be regulated and, on the other hand, the front and rear engaging members **37***b* and **37***c* provided in the ram air intake duct **36** are engaged respectively with the front and rear engagement areas **62***b* and **62***c* provided in the holder **60**, allowing the holder **60** to be regulated in position relative to the ram air intake duct **36** in the direction circumferentially thereof. Therefore, with a simplified structure, the positioning of the holder **60** relative to the ram air intake duct **36** can be accomplished easily.

Since the acoustic material **50** is prepared from urethane sponge, the holder **60** is easy to bite into the flexible urethane sponge to smoothen the inner surface of the holder **60** and as a result, the air resistance can be reduced advantageously. In particular, in the case of the holder **60** being in the form of a net, biting into the flexible urethane sponge takes place easily.

Also, since each of the holder **60** and the ram air intake duct **36** is of a split type molded products comprised of upper and lower mold segments, each of the holder **60** and the ram air intake duct **36** both having a complicated shape can be easily formed by the use of a die forming technique.

Also, since the ram air intake duct **36**, the stays **40** for the support of the respective side viewing mirrors **38** and the bracket **44** for the support of the gauge unit **42** are formed integrally, the number of component parts used in the ram intake unit **34** of the present invention can be reduced, allowing the number of assembling steps to be reduced accordingly. Considering that they are formed integrally from the synthetic resin, the weight can be reduced owing to the use of the synthetic resin while the rigidity of the entirety can be increased to secure a required strength to thereby enhance the sound absorbing effect brought about by the increase of the rigidity.

Moreover, since the gauge mounting surface **44***a* oriented diagonally rearwardly and the mirror mounting surfaces **40***a* oriented diagonally forwardly are connected together by means of the substantially flat and continuous wall **47**, no recess is formed rearwardly of the mirror mounting surfaces **40***a* enough to increase the volume of the ram intake unit **34** and, therefore, the rigidity of the ram intake unit **34** is increased to allow the gauge unit **42** and the side viewing mirrors **38** to be supported firmly. Also since the reinforcement ribs **53** are provided in the rear surface of the bracket **44**, the gauge unit **42** and the side viewing mirrors **38** can further firmly be supported.

Furthermore, since the headlamp support pieces **46** for supporting the headlamp assembly **20** and the hook **69** for fixing the harnesses (not shown) that are connected with the gauge unit **42** are also formed integrally, the number of component parts used and the number of assembling steps can be further reduced advantageously.

Yet, since the resonator chamber **48** in which the induction sounds can be reduced is formed integrally, the number of component parts used and the number of assembling steps can be reduced, and also the capacity of the resonator chamber **48** can be brought in by the effective utilization of a space below the ram intake unit **34**. In addition, fitting the amplifier **41** for the immobilizer to the resonator chamber **48** makes it possible to effectively utilize a space below the ram intake unit **34**.

Although the present invention has been fully described in connection with the preferred embodiments thereof with reference to the accompanying drawings which are used only for the purpose of illustration, those skilled in the art will readily conceive numerous changes and modifications within the framework of obviousness upon the reading of the specification herein presented of the present invention.

Accordingly, such changes and modifications are, unless they depart from the scope of the present invention as delivered from the claims annexed hereto, to be construed as included therein.

What is claimed is:

1. A ram intake unit mounted on a front portion of a frame structure of a motorcycle, comprising:
- an acoustic material disposed along an inner wall of a ram air intake duct, forming an induction system for a motorcycle combustion engine, for absorbing induction noises; and
- a holder for securing the acoustic material to the ram air intake duct, the holder being of a netted configuration and disposed inwardly of the acoustic material,
- in which the acoustic material bites or cuts into meshes of the netted holder to allow an inner surface of the holder to be flush with an inner surface of the acoustic material to provide a combined smoothed continuous inner surface.

2. The ram intake unit as claimed in claim **1**, in which the acoustic material and the holder are accommodated within a recess defined in an inner surface of the ram air intake duct and are then regulated in their position in a direction longitudinally thereof.

3. The ram intake unit as claimed in claim **1**, in which an engagement member provided in the ram air intake duct is engaged with an engagement area, provided in the holder, to thereby regulate the position of the holder relative to the ram air intake duct in a direction circumferentially thereof.

4. The ram intake unit as claimed in claim **1**, in which the acoustic material is made of an urethane sponge.

5. The ram intake unit as claimed in claim **1**, in which the holder is of a split type molded products comprised of upper and lower mold segments.

6. The ram intake unit as claimed in claim **1**, in which the ram air intake duct is of a split type molded products comprised of upper and lower mold segments.

7. The ram intake unit as claimed in claim **6**, in which each of the acoustic material and the holder includes two parts fitted to the respective mold segments of the ram intake unit.

8. The ram intake unit as claimed in claim **1**, further comprising a stay for supporting a side viewing mirror and a bracket for supporting a gauge unit, and in which the ram air intake duct, the stay and the bracket are integrally formed by a synthetic resin molding.

9. The ram intake unit as claimed in claim **8** further comprising a headlamp support molded integrally for supporting a headlamp assembly.

10. The ram intake unit as claimed in claim **8**, further comprising a resonator chamber formed integrally for reducing induction noises.

11. The ram intake unit as claimed in claim **1**, in which the acoustic material is made of a flexible material and firmly fixed to the ram air intake duct while having been sandwiched between the holder and the ram air intake duct.

12. A ram intake unit mounted on a front portion of a frame structure of a motorcycle, the ram intake unit comprising:
- an acoustic material disposed along an inner wall of a ram air intake duct, forming an induction system for a motorcycle combustion engine, for absorbing induction noises;
- a holder for securing the acoustic material to the ram air intake duct;
- a stay for supporting a side viewing mirror; and
- a bracket for supporting a gauge unit,
- in which the ram air intake duct, the stay and the bracket are integrally formed by a synthetic resin molding,
- in which the bracket has a gauge mounting surface oriented diagonally rearwardly and the stay has a mirror mounting surface positioned laterally of the meter mounting surface and oriented diagonally forwards and in which a region ranging from the gauge mounting surface of the bracket to the mirror mounting surface of the stay is connected by a flat and continuous wall.

13. The ram intake unit as claimed in claim **12**, in which the gauge mounting surface of the bracket represents a sector shape when viewed from top.

14. A ram intake unit mounted on a front portion of a frame structure of a motorcycle, the ram intake unit comprising:
- an acoustic material disposed along an inner wall of a ram air intake duct, forming an induction system for a motorcycle combustion engine, for absorbing induction noises;
- a holder for securing the acoustic material to the ram air intake duct;
- a stay for supporting a side viewing mirror; and
- a bracket for supporting a gauge unit,
- in which the ram air intake duct, the stay and the bracket are integrally formed by a synthetic resin molding,
- in which the bracket has a rear surface provided with reinforcement rib.

15. A ram intake unit mounted on a front portion of a frame structure of a motorcycle, the ram intake unit comprising:
- an acoustic material disposed along an inner wall of a ram air intake duct, forming an induction system for a motorcycle combustion engine, for absorbing induction noises;

a holder for securing the acoustic material to the ram air intake duct;

a stay for supporting a side viewing mirror;

a bracket for supporting a gauge unit, and

a hook for securing a harness to be connected with the gauge, in which the ram air intake duct, the stay, the bracket and the hook are integrally formed by a synthetic resin molding.

16. A ram intake mounted on a front portion of a frame structure of a motorcycle, comprising:

an acoustic material disposed along an inner wall of a ram air intake duct, forming an induction system for a motorcycle combustion engine, for absorbing induction noises; and

a holder for securing the acoustic material to the ram air intake duct, the holder being of a netted configuration and disposed inwardly of the acoustic material,

in which the acoustic material bites or cuts into meshes of the netted holder to allow an inner surface of the holder to be flush with an inner surface of the acoustic material to provide a combined smoothed continuous inner surface, wherein

the meshes of the holder are delimited by a plurality of ribs each having inner and outer surfaces, the inner surface having opposite end edges each representing a sharp corner and the outer surface having opposite end edges, each representing a rounded corner.

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